

ABOUT THESE MAPS

Maps a, b and c show the at-sea density (birds/km²) of Pacific Loon (*Gavia pacifica*) in three ocean seasons – Upwelling, Oceanic, and Davidson Current, displayed in cells of 5' latitude by 5' longitude. Densities are based on the combined data sets of several studies; see the Data and Analyses section of this chapter. The color and mapping intervals were selected to show the most structure and highlight significant areas, while allowing comparisons among marine bird species. Cells that were surveyed but in which no Pacific Loons were observed have a density of zero. Areas not surveyed appear white; no information was available for these areas. Blue lines indicate the boundaries of the National Marine Sanctuaries in the study area: Cordell Bank, Gulf of the Farallones and Monterey Bay. Bathymetric contours for the 200 m and 2,000 m isobaths are shown in light blue.

In order to provide an integrated look at the patterns of a species' spatial and temporal occurrence and abundance in the study area, map d shows seasonal high-use areas, displayed in cells of 10' latitude by 10' longitude, and also breeding colonies (when available). The seasonal high use map provides a further synthesis of densities presented in maps a, b and c, and portrays the relative importance of various areas to the species. Areas with consistently high use are highlighted. See the Data and Analyses section of this chapter for further explanation of high-use areas.

DATA SOURCES AND METHODS

The at-sea data set is referred to as the CDAS central California data set (1980-2001) and was developed using software called Marine Mammal and Seabird Computer Data Analysis System (CDAS), by the R.G. Ford Consulting Co. The data set extends from Pt. Arena to Pt. Sal in the study area, and the surveys used were conducted between 1980 and 2001. See the Data and Analyses section of this chapter for more information on the at-sea survey data sets and methods.

RESULTS AND DISCUSSION

The Pacific Loon is the most marine of the five loon species that occur in the north/central California study area, where it is common; in the CDAS data set (1980-2001), there were 1,172 sightings of 4,191 individuals. The other loon species, including the Common Loon (a California State "Species of

Special Concern"), had 166 individuals observed in surveys in CDAS, mostly in bays and estuaries. Midway in the study period (1980s) the Arctic Loon species was "split" into: Arctic Loon (Asian form, *G. arctica*) and Pacific loon (w. North American form, *G. pacifica*). From that time, any Arctic loons seen in the study area, would be considered vagrants; only rarely has one ever been detected because they must be held in the hand to assess such characteristics as the color of the sheen to their plumage.

A multiple regression analysis of nine independent variables explained 10.6% of the variation in cell density of the Pacific Loon. The three most important variables were: season (most abundant during Davidson Current Season and least during Oceanic Season), distance to land (most abundant close to shore), and latitude (more abundant in the south); see Table 3.8. The average ocean depth where Pacific loons occurred was deep, 300 ± 29 m, and average distance from land was 13 ± 0.9 km from land. Pacific Loons within the study area occurred most often in the inshore waters of Monterey Bay, although they do occur throughout the nearshore waters of the study area. This is especially the case during the Davidson Current Season. The Farallon Escarpment was also important for migrants, for both the Upwelling and Davidson Current seasons. Thus, the marine sanctuary boundaries generally encompass the majority of the species "high use" habitat in the study area. Also, the species occurred in the study area in all three seasons. North and south of the sanctuaries, Pacific Loons were sporadic in occurrence, owing to the narrow continental shelf in those areas. Abundance of this species has remained stable between 1985 and 2002.

Pacific Loon is a deep diver that presumably feeds mainly on fish; no study of its foraging in marine waters of the West Coast has ever been conducted. See Tables 3.5, 3.8, 3.9, 3.10 and 3.11 for related summary information.